

SIXPENCE

MARCH 1941

AMATEUR RADIO

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OF THE
WIRELESS INSTITUTE
OF
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March, 1941

EDITORIAL

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In 1933 "Amateur Radio" was born--the Child of the Victorian Division's most enthusiastic members, whose foresight saw the need of such a magazine as a further means of communication between its members and the members of other Divisions.

To publish a magazine was no small task, and the enthusiasm with which it was received was more than sufficient reward to those workers who were responsible for the first issue.

The continued success of any magazine lies in the support it receives from its readers and its advertisers. Unfortunately for "Amateur Radio" its advertisers decided, that, as a large number of its readers were "off the air" it was no longer a good advertising medium, and so discontinued advertising.

This, the first issue of "Amateur Radio" in its new form marks another mile-stone in the history of the magazine -- A magazine of the Amateur -- By the Amateur -- For the Amateur.

To our members and readers we appeal for their wholehearted support to enable us to bring you current overseas and local developments together with personal notes of various doings.

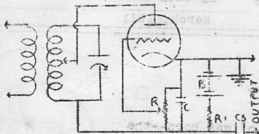
CO-OPERATION is and always will be the keynote of success.

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A NEW TYPE OF NOISE LIMITER

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Man-made noise has long been one of the "bug-bears" of the amateur, particularly in the region of 14mc and higher frequencies. It has been shown that the majority of this noise consists of peaks of very short duration, but large amplitude. Many systems have been designed to limit these peaks, but the more successful systems have been more or less complicated.



The accompanying circuit shows a new type of limiter, which has been designed by the engineers of RCA laboratories. In addition to acting as a very simple type of noise limiter, this circuit has a definite AVC action on CW and so is doubly useful.

It will be seen that the circuit consists essentially in the use of a triode to replace the usual diode detector, the triode grid being controlled by the signal. The anode cathode path of the triode is used as a diode and is connected with the usual load resistance and by-pass condenser.

In the absence of signals the anode potential is kept positive with respect to cathode by the voltage developed across R and the grid is also positive with respect to cathode, but is less positive as it is tapped down R. The valve then works as a form of diode detector and as the signal increases the anode and grid potentials become less positive. With sufficiently strong signals the potentials actually become negative with respect to the cathode. Once this point is reached a further increase in signal hardly increases the output at all.

The limiting action may be controlled by the tapping on R and is greatest when the grid is joined to the junction of R and C3. The higher the voltage the greater is the signal strength at which saturation commences.

It is possible to simplify the circuit by the use of a pentode tube in the place of the triode. R1 and B are no longer required but the screen must be maintained at a suitable positive potential with respect to the cathode; otherwise the circuit operates in a similar manner.

Care should be taken to keep RF off the grid, and it may be found necessary to insert a simple RF filter in the grid lead.

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The Wireless Institute is your Organisation -- help it look
- after your interests by becoming a member -

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- FREQUENCY OR AMPLITUDE MODULATION -
-----XXXXXXXXXXXX-----

During the last couple of years so much has been published in overseas technical magazines on the subject of frequency modulation that it is of interest to learn of comparative field tests carried out contrasting this type of modulation with amplitude modulation. The results of the tests in question were given in a paper read before the Radio Club of America by Mr. Irwin R. Weir.

The tests were carried out to determine quantitatively the advantages of f.m. over a.m. under identical conditions. Two separate transmitters were used for the test, one frequency modulated and the other amplitude modulated. Both had a carrier output of 50 watts, and were operated on a frequency of 41mc. The receiver used was a portable adapted for the reception of both systems of modulation.

The first observations were made in a district free from outside electrical interference, the object being to determine the ratio between the internal noise of the receiver when dealing with a plain unmodulated carrier wave and when receiving a signal employing first one and then the other form of modulation. It was found that for any desired output ratio of signal--plus noise--to noise alone, which experience may indicate is required for satisfactory service, considerably less signal input, and hence considerably less transmitted field strength is required with frequency than with amplitude modulation.

For the second test the receiver was taken to a district where electrical interference was known to be bad. It was found that under the conditions of external noise met with, the superiority of f.m. was even more marked than in the first test.

Other tests, too numerous to mention in detail were carried out, but it is interesting to list the conclusions finally arrived at by the investigators. These were:-

1. The design, construction and operation of a f.m. transmitter needed no more complicated than that of an a.m. transmitter.
2. The f.m. transmitter can be smaller, lighter and more economical of power than an a.m. transmitter of the same power rating.
3. The f.m. receiver need be no greater in size or weight than the conventional a.m. type.
4. A given area can be satisfactorily served by means of f.m. with considerably less power than by means of a.m.
5. A given transmitter power will provide service to a much larger area, or with a much lower noise level when employing f.m. instead of a.m.
6. F.M. transmitters operating on the same frequency need be less distant from each other than is necessary with the operation of a.m. transmitters on the same frequency channel.
7. The number of f.m. transmitters that might be simultaneously operated within any large area on a given number of f.m. channels and with given permissible interference areas, is so great compared with the number of a.m. transmitters that

might be so operated, as to more than compensate for the width of the frequency band required to take substantial advantage of the superiority of frequency modulation.

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A.R.R.L. HANDBOOK FOR 1941

The organization of the new edition follows that developed for the 1940 volume. The 32 chapters in the new Handbook constitute exposition of practical amateur operating and constructional data. First, there are two introductory chapters, intended for the new-comer first learning about amateur radio. There are four chapters on principles and design, covering the essential elements of radio theory in understandable fashion.

There are fourteen chapters in the construction and adjustment section ranging from workshop practice through to the elimination of broadcast interference. In these chapters dozens of modern, proved units of high performance amateur stations are described in detail.

The antenna section contains five chapters alone covering the field from basic principles to the design and construction of elaborate long-wire and rotary arrays. The ultra-high frequency section, too, contains five chapters. An entirely new section on the important subject of frequency modulation has been added.

Other phases of amateur radio are considered separately. There are chapters on emergency and portable equipment, on measurements and measuring equipment, on station assembly, and on government regulations and related data. There is one chapter devoted to miscellaneous information, the bulk of which is occupied by tables of tube characteristics. These comprise what is probably the most complete single compilation of vacuum-tube data published, covering some 700 types.

This handbook can be thoroughly recommended to either the seasoned "Ham" or the would be Ham.

- TRANSMITTERS AFFECTED BY NEW REGULATIONS -

The news has just been released that all licensed radio transmitters in Australia before the war will be affected by the new regulations concerning radio transmitting equipment, diathermy machines and other high frequency electrical equipment.

The regulation provides that all such equipment shall be held by the owners under licence, and although the Amateurs obligations in this matter are not yet clear, it is thought that they will be advised by the Department by letter of what they will have to do.

QUEENSLAND HAMS SERVING WITH THE DEFENCE FORCES

ARMY

| | | |
|-------|---------------------|------------------------------|
| VK4YJ | Lt. Col. Sainsbury. | OIC Signals Northern Command |
| VK4CF | Lt. Col. Fortescue. | Garrison Commander. |
| VK4JL | Major J. Love. | A.I.F. |
| VK4FE | A. R. Burton. | Signals. Tanks, A.I.F. |
| VK4LT | A. B. Carter. | Signals. |
| VK4WO | H. Tilse. | Signals. |

ROYAL AUSTRALIAN NAVY.

| | | | |
|-------|----------------|-------|--------------|
| VK4RF | F. J. Lubach | VK4CJ | C. W. Marley |
| VK4SD | A. H. Sparland | VK4NO | N. Thuge |
| VK4EI | R. Belstead | VK4FJ | S. R. Baxter |
| VK4SR | T. S. Shering | VK4NR | .. Richards |

ROYAL AUSTRALIAN AIR FORCE

| | | | |
|-------|----------------|-------|---------------|
| VK4AM | F. Lt. Minchin | VK4AW | A. E. Walz |
| VK4CW | E. Welan | VK4AN | J. Aillon |
| VK4CK | J. Makin | VK4KK | K. Bradford |
| VK4RX | R. Blades | VK4RH | R. Hows |
| VK4YM | D. Cohen | VK4WF | W. J. Taber |
| VK4FS | F. Starr | VK4RM | R. Meadows |
| VK4FR | R. Allen | VK4XY | L. I. McGarry |

ESSENTIAL AND ALLIED SERVICES

| | | | |
|-------|-----------------|----|----------------------------------|
| VK4OX | A. H. MacKenzie | .. | Fire Brigade |
| VK4ES | H. Sprenger | .. | Police Force Radio |
| VK4MR | J. E. Stewart | .. | OIC Manpower Register |
| VK4RY | W. L. Harston | .. | Deputy Air Raid Warden Clayfield |
| VK4JB | C. Alder | .. | Air Raid Warden (Dist.) |
| VK4AH | A. Hadley | .. | Civilian Instructor R.A.A.F. |

SILENT KEY.

It is with regret that we announce that VK4FS. F. Starr has been lost at sea.

Additional Victorian Hams in the Defence Services.

| | | | | | |
|-------|-----------------|----------|-------|---------------|----------|
| VK3EG | I. V. Miliar | A.I.F. | VK3VG | H. A. Vinning | A.I.F. |
| VK3WH | A.W.L. Ghandler | R.A.A.F. | VK3XZ | R.R. McGregor | A.I.F. |
| VK3DW | D. W. Tacey | R.A.A.F. | VK3XU | A.G. Weynten | A.I.F. |
| VK3FU | D. E. Briggs | R.A.A.F. | VK3TR | J.A.P. Boyd | R.A.A.F. |
| VK3VH | L. W. Hobbin | A.I.F. | VK3YH | F.W. Hand | R.A.A.F. |
| VK3XB | I. Stafford | R.A.A.F. | | | |

Further names will appear in these pages from time to time, and "Ham" knowing of another serving in the forces, whose name has not appeared is asked to forward details to "Amateur Radio" Box 2611W G.P.O. Melbourne.

D I V I S I O N A L N O T E

- Victorian Division -

Now more than ever the need for personal notes has become more imperative, and once again I am appealing to readers to think a little of the person who has to write these notes. We are off the air, that everyone knows, so the poor old notes editor is unable to do a little "snooping". Consequently the only means of obtaining notes is by personal contact and per medium of the post office. To those of the "gang" who are in camps either at home or overseas an appeal was also made, asking them to keep us posted of their doings. Unfortunately the response has been practically nil, with the consequent result of very little notes.

As Notes Editor, I extend to those who took the time and trouble to drop me a line, my sincerest thanks, and to those who haven't yet got round to putting pen to paper, do so now and let's have a bumper issue of notes for next month.

VK3HX Notes Editor.

Since the last issue a note arrived from Lee Simpson 3II. Thanks Lee, your note helps out a lot. Lee reports that he is still re-wiring things even though its fences instead of radio. Methinks Lee is going to be an expert wireman by the time we get back on the air. Let's hear from you again sometime Lee.

Tim, 3TW is still on the air, and the wireless bird has whispered to me that he has a large "fan" mail. Say Tim got any signed photographs? Tim, known as George, is to be heard from 3HA usually of a morning.

Stan, 3SZ is still healing radios at Healings in Hamilton (Did I hear anyone say anything about puns?)

Eric, 2AHY seems to me to be something of a mystery man, and has been visiting VIM rather frequently -- I've got my suspicions --

Ern, 3EC has been reported to be looking for signals which shouldn't be there. The rest of his spare time has been spent in doing a spot of painting around the house.

3JG -- has, I understand, taken unto himself a wife -- Congratulations John. Would like to hear from you sometime.

Ron 3RN spends most of his time keeping the garden in order. I heard something about an amplifier last New Years Eve???

3NY had a visit from the I.I. recently: 3JO had the same experience.

3ZK is now to be located at Cootamundra, I hope?

3WY has been playing around with audio--57 triode resistance coupled to a pair of 45's par, and the noise comes out of a G12.

A visitor to the general meeting was Miss M. E. Coutts VK3KS, and if I may say so a very charming visitor. Its just too bad we're not still on the airCareful boys ...watch 3XB.

AC1 Fleming was also another visitor, one of the lucky ones who had his thirty bob refunded???? Best of luck feller.

And then there is the story that comes from one of the RAAF Stations, when 3YH rushed into one of the huts to tell another VK3 that there was a VK6 calling CQ on a tin whistle in the ?x?house????

Next month, April the 6th to be exact, Mr. J. Kling VK3JB will continue his interesting series of lectures, the subject matter will be "PHOTOGRAPHY", so if you're interested come along and join the happy party.

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N.S.W. DIVISIONAL NOTES

by VK2TI -

The thirty-first annual General Meeting of the VK2 Division of the Institute was held at Y.M.C.A. Buildings, Pitt Street, Sydney on Thursday 20th February, and the attendance was the largest for some time.

The Chair was occupied by Mr. Frank Goyen VK2UX, Senior Vice-President, in the absence of the President Mr. H. Peterson, through illness and in declaring the meeting open extended a welcome to the guests of the evening, Messrs. Perry, Reed, Stowe, Pike, Renshaw and MacLurean and to two country members, Messrs. Torrington 2TV Groote Eylandt and F. Blatch, Yeoval.

Before proceeding to business one minute's silence was observed in memory of Corporal V. Jarvis 2VJ, who was killed in action in Libya whilst serving with the R.A.A.F.

Mr. Joe Reed 2JR then proceeded with his display and description of gear used in the very early days, and his collection of various mounted component parts was very instructive to the "young squirts" and the manner of their acquisition proved that "Joe" was a real ham in every way. The collection of Valves was comprehensive and besides types "R" and "S" also included the famous "EXPENSE" type. It would be doing 2JR an injustice if I were to conclude without mentioning Joe's first tuning coil. It was approximately three feet long, six inches in diameter and about 2,000 turns. What an industance ! What a man !

2JR was followed by Harry Stowe ex-2CX who showed several types of early Audio Transformers. These particular pieces of apparatus were of very neat design and workmanship and were a credit to the builder.

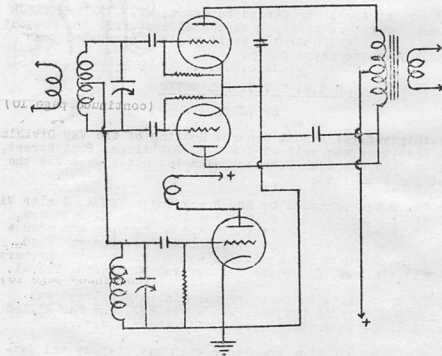
A QUIET BEAT FREQUENCY OSCILLATOR CIRCUIT

(Of easy construction)

Adapted from an article by E. L. Gardiner in the T & R Bulletin

1947 11 15

Most users of superhetrodyne receivers will have noticed the aggressive hiss which so often assails the ear when the B.F.O. is switched on. Admittedly it can be minimized by keeping the B.F.O. very weak and by the selection of a low noise level triode for that stage, but in the former case the remedy prevents the full realisation of the increased signal strength which should result from the addition of a correctly adjusted beat oscillator. A very useful improvement can be attained by the use of the circuit shown.



PUSH-PULL DETECTION

The essential requirement of this circuit is the adoption of push-pull detection as shown in the circuit. Here two triodes have been used as the second detector stage, a 6N7 double-triode being very convenient for the purpose. If A.V.C. is required it may then be necessary to add a separate diode.

The advantage of push-pull triodes lies in the ease with which the necessary push-pull output may be obtained by means of a centre-tapped audio transformer. An audio transformer will effectively match the impedance of triodes, but if used to follow diodes a certain amount of distortion is theoretically

to be expected. The simple grid leak and condenser arrangement shown has been found very sensitive on CW and is probably as good as any other for DX reception, whilst the cancellation of direct magnetising current in the primary of the push-pull transformer seems to lead to a very satisfactory impedance matching and pleasing reproduction.

THEORETICAL CONSIDERATIONS.

Considering now the main reason for the arrangement, it will be seen that the B.F.O. is injected into the center tapping of the T.F. transformer feeding the detector stage. Practically, after trying several forms of coupling, it was found quite satisfactory to take this point to earth through the grid circuit of the oscillator as shown. It is important that the oscillator should not couple into the T.F. channel through stray paths, and it should be adequately screened. Direct coupling, as shown, assists in this respect. The actual strength of oscillation can be kept low whilst still providing an ample voltage at the detector grid.

Now since the B.F.O. is injected into the center tap of the IFT it reaches the grids of the two detectors in phase, the two halves of the secondary winding merely acting as series impedances. But any voltages which are in the same phase at the two grids will cancel out in the anode circuit & producing no output from the audio transformer, provided, of course, that the two detectors are balanced. Therefore on switching in the B.F.O. any hiss in the oscillator due to valve noise etc. is not effectively detected, and so produces little or no noise in the audio stages. This argument only applies in the absence of signals. When a carrier arrives from the T.F. amplifier, it is induced into the I.F.T. secondary in the correct manner for push-pull operation, producing voltages in opposite phase at the two grids -- it is thus efficiently rectified. The B.F.O. beats with the carrier in each detector producing two audio beats which are in opposite phase at the respective anodes, and therefore add in the audio transformer to produce an audio signal of double the usual strength. Thus the circuit has the effect of greatly reducing B.F.O. noise in the absence of signals, whilst increasing the audio beat produced when a signal arrives. The vital requirement of a quiet back-ground, is thus assisted.

PRACTICAL RESULTS.

Under practical conditions the circuit described leads to a much improved beat-to-noise ratio. It is found that on switching on the B.F.O. very little hiss is heard, and this can be reduced to a minimum if necessary by careful matching of the two detectors, such as by slight adjustment of grid bias on one of them. It is then possible to increase the amplitude of the oscillator by a factor of perhaps 10 or 20 fold without introducing more than a very slight hiss in the absence of signals. The amplitude of the audio beat is given mathematically by the product of that of the signal and of the beat oscillator, and therefore increases, if, as in this case, it is possible to increase the oscillator amplitude without introducing other defects such as hiss. A weaker I. F. signal will now be required to produce a given beat loudness, and we should expect the loudness of the audio signal to be greater.

Practical tests show the improvement to be striking. The receiver using this circuit was placed beside a well known commercial receiver and the same signal tuned in on both. On switching in the B.F.O. of the commercial receiver, the best note became audible at about S1 to S3, a very doubtful R5 in the presence of interference. In the push-pull receiver however the switching on of the oscillator brought up the carrier from inaudibility to a solid S7 to S8 beat, fully readable under noisy conditions. Since such a marked increase of audio output occurs it would clearly be possible to work with a weaker signal in the earlier stages of the receiver. I.F. gain could be reduced, and with it one would expect to reduce any valve or circuit noise arising in the first R.F. stage, thus improving the signal-to-noise ratio of the receiver as a whole.

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(Continued from page 7) -

2JP, Jack Pike, who incidentally has a son on Active Service overseas, gave a few reminiscences of the early days.

A-2CM Chas. Maclurcan thanked 2JR for the wonderful Sales talk given earlier in the evening and only regretted that he was not now in the Radio trade.

2DE Phil Renshaw thanked the Division for their action in conferring Life Membership upon him.

Malcolm Perry suggested that the Institute obtain space for the collection and storage of relics.

In the list of VK2 hams on service published in the December issue of "Amateur Radio" appeared the name of N. Southwell 2ZF. This call was inserted in error and any inconvenience caused to Mr. Southwell is regretted.

The March General Meeting of the Division will be held at Y.M.C.A. Buildings Pitt Street Sydney on Thursday 20th, and any ham on service whether he be a Member of the Institute or otherwise is assured of a very hearty welcome. A very interesting talk will be delivered by Mr. A. J. Brown VK2LK. 2LK was in England and on the Continent immediately prior to the outbreak of war and as his talk will be illustrated by a movie camera, Members may look forward to a very interesting night.

Members will regret to learn that the Divisional President Harold Peterson VK2HP has not been enjoying the best of health for some few weeks and will join in wishing him a speedy recovery.

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**THE WIRELESS INSTITUTE
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VICTORIAN DIVISION**

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

**DO YOU WANT TO BE
BACK ON THE AIR?**



**THE WIRELESS INSTITUTE
OF AUSTRALIA**

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Join Now !

When the time comes that we can reasonably expect to go back on the air, we want to say that we represent—

EVERY ACTIVE HAM

in the Commonwealth.

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